

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION**

NCS MULTISTAGE INC.,
NCS MULTISTAGE, LLC,

Plaintiffs,

vs.

NINE ENERGY SERVICE, INC.,

Defendant.

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CIVIL ACTION NO. 6:20-cv-00277-ADA

PLAINTIFFS' SUPPLEMENTAL CLAIM CONSTRUCTION BRIEF

PUBLIC VERSION

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NCS's expert and Nine's expert are in a dispute over the scope of the term "casing string," the resolution of which is critical to Nine's anticipation defense and NCS's rebuttal. NCS's expert contends that in the oil and gas industry "casing string" is a strand of pipe with a minimum diameter of 4.5 inches, lowered into a wellbore, and cemented in place. Nine's expert agrees that the industry standard minimum diameter for casing is 4.5 inches, but that the term "casing string" could include pipe with a diameter smaller than 4.5 inches if that pipe is cemented into a wellbore. NCS respectfully requests the Court resolve this dispute under *O2 Micro* and adopt the well-known plain meaning of "casing string", which is "pipe that is ≥ 4.5 inches in outer diameter used to case a wellbore."

All claims of U.S. Patent No. 10,465,445 ("the '445 Patent") recite a rupture disc assembly that is configured to connect to a "casing string." The patent discloses various apparatuses and methods for running casing string through the horizontal portion of a wellbore.

Casing is pipe that is run into a wellbore and then cemented in place to maintain the integrity of the wellbore. It is well-understood in the oil and gas industry that casing has a minimum diameter of 4.5 inches. During expert discovery, Nine's expert, Dr. Meehan, asserted that casing could be pipe of any diameter, so long as the pipe was used to case the well. Dr. Meehan made this assertion as part of offering opinions that a tool called the TDP-PO is a casing tool which invalidates the '445 Patent. Rebutting these opinions, NCS's expert, Dr. Rodgers, set forth voluminous intrinsic and extrinsic evidence that casing is never smaller than 4.5 inches in diameter, and that the TDP-PO tool – which is designed to be attached to 3.5-inch diameter pipe – is too small to be used as part of the "casing string," as required by the '445 patent. The TDP-

PO is a tubing tool, not a casing tool.¹ The experts thus dispute the definition of “casing string,” a dispute that is fundamental to Nine’s invalidity defenses.² This dispute over the proper construction of “casing string” must be resolved by the court before trial; otherwise, the jury will be presented with competing constructions of the term “casing string” and will have to decide what this claim term means, in violation of *O2 Micro*.

NCS respectfully requests that the Court construe “casing string” to mean “pipe that is \geq 4.5 inches in outer diameter used to case a wellbore.”³

I. Background

A. The '445 Patent and Asserted Claims

The '445 Patent is directed to casing tools used in drilling oil and gas wells. Dkt. 58-1 ('445 Patent) at Abstract, 1:16-17, 3:25-33. It teaches rupture disc assemblies and methods of using the assemblies to “float” a casing string into a well. *Id.* To make a well, a borehole (or hole) is drilled into the Earth’s crust. Initially, the hole is drilled vertically. *Id.* at Fig. 1, annotated portion 130 (green)); Dkt. 41-1, ¶16. When the

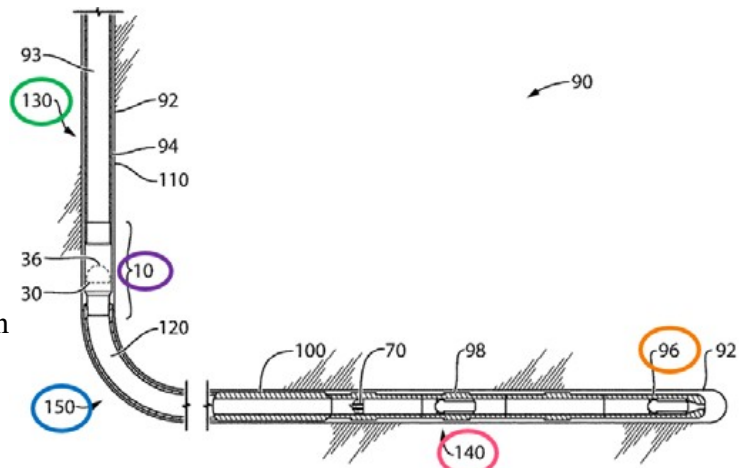


FIG.1

¹ Tubing tools are smaller than casing because tubing is run inside casing. Dkt. 158-1 (Rodgers Rebuttal Report), ¶100. The purpose of casing is to stabilize the well. *Id.* After a well is cased, tubing is run inside casing to act as a conduit for the hydrocarbons. *Id.* Casing protects the hole; tubing is used to release the oil or gas from the formation (completions are performed using tubing) and transmit it to the wellhead. *Id.*

² The dispute does not bear on the infringement claims because the accused BreakThru devices are casing tools with a diameter of 4.5 inches.

³ This brief is supported by the Declarations of Dr. John P. Rodgers (“Rodgers Decl.”) and Megan R. Wood (“Wood Decl.”), attached hereto as Exhibits D and E, respectively.

driller reaches a target position (hydrocarbon layer), the drilling turns (150 (blue)) and progresses in the lateral direction such that there is a horizontal portion 140 (pink). Dkt. 41-1, ¶16. After the horizontal is drilled, pipe called casing (typically in 9-foot lengths) is connected together in a “string” and run into the hole to maintain the integrity of the borehole. *Id.* at ¶ 17. As the casing string enters the heel 150 and turns horizontal, it will start to drag. *Id.* Eventually, if the drag is equal to the pushing force, the casing string gets stuck. *Id.*; Dkt. 58-1 at 1:22-29, 5:52-58. To overcome this problem, techniques were developed to “float” the casing string through the horizontal portion 140 (pink), by making the casing string buoyant, thereby reducing the drag. Dkt. 58-1 at 1:30-46; Dkt. 41-1, ¶¶16-18, 34. Once the casing is run to the end of the borehole, it is cemented in place.

Asserted claim 28 is exemplary of the claims of the ’445 Patent, all of which recite a rupture disc assembly that is configured for connection to “casing string”:

A float tool configured for use in positioning **a casing string ...** the float tool comprising:

a rupture disc assembly comprising ... upper and lower ends **configured for connection in-line with the casing string ...** and

the region of the tubular member where the rupture disc is attached has a larger internal diameter than the internal diameter of **the casing string** and is parallel to the internal diameter of **the casing string**.

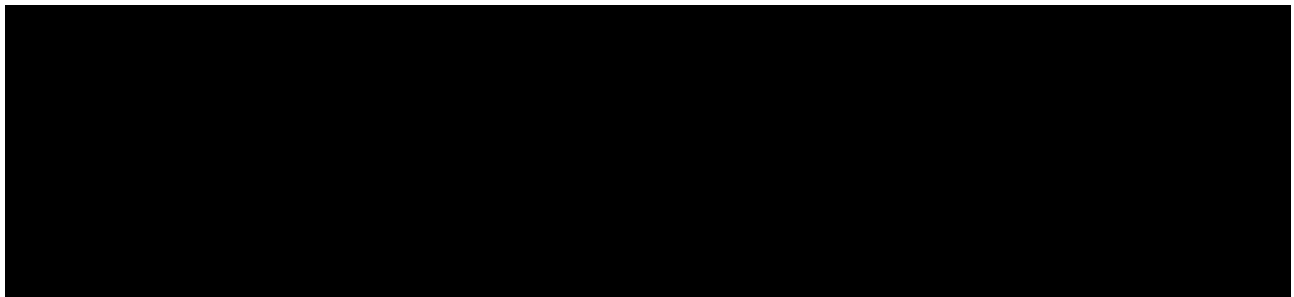
Dkt. 58-1 at claim 28 (emphasis added).

B. The Experts’ Dispute Over The Meaning Of “Casing”

On August 16, 2021, Nine served Dr. Meehan’s First Amended Expert Report on Invalidity. *See* Dkt. 106-1 (Meehan Invalidity Report). In this report, Dr. Meehan extensively discusses two downhole tools designed by TCO AS (“TCO”) called “Tubing Disappearing Plug – Pump Open”, which he collectively calls “TDP-PO”. *Id.* at ¶¶83-100. Dr. Meehan offers

anticipation and obviousness opinions based on the TDP-PO tool. *Id.* at ¶143. Dr. Meehan states that his opinions regarding the TDP-PO tool are based on reviewing drawings (including drawing number 1018-12-001), a letter from TCO to NCS about an alleged prior sale of the TDP-PO tool, and statements by Viggo Brandsdal (either in his deposition or a conversation with Dr. Meehan). *Id.* at ¶¶83-84. Every opinion Dr. Meehan offers regarding this tool depends on the factual predicate that the TDP-PO is designed as a casing tool. *See, e.g., id.* at ¶99 (“the TDP-PO plug housing has threaded ends to connect in-line with the casing”); ¶212 (“configured for use in a casing string” and “installed and run as an integrated part of the casing string”); ¶213 (“housing connects in-line with the casing string”); ¶¶215, 218, 220, 222, 225 (describing the operation of the TDP-PO plug as part of the casing string); ¶299 (“First, the TCO TDP-PO plug is installed as an integrated part of the casing”).

But casing has a minimum size of 4.5 inches, and the TDP-PO tool is too small to be used with casing. This is clear from the TDP-PO drawings, which depict a design that has threads for connecting with pipe that is 3.5 inches in diameter⁴:



Dkt. 121-1. TCO’s TDP-PO is a tool designed to be used with tubing. That is clear from its full name, “**Tubing** Disappearing Plug – Pump Open.” It is not designed to be used with casing.

When challenged at his deposition that the TDP-PO tool was not a casing tool, Dr.

⁴ VAM TOP is a type of thread. *See* Dkt. 123, ¶5 (citing Dkt. 127 at 1 (p. C-3)). On this drawing, the thread is designed to attach to 3.5-inch diameter pipe.

Meehan could have conceded that the TDP-PO is a tubing tool and therefore could not anticipate the asserted claims.⁵ Instead, he re-defined casing to mean pipe of any size – so long as it was used to case a well – even if it was less than 4.5 inches in diameter. To support this definition, he cited his own 40-year-old experience casing vertical wells with pipe smaller than 3 inches in diameter. Dkt. 121 (Meehan Depo. Tr.) at 114:4-15; 197:25-198:11.

On September 9, 2021, NCS served Dr. Rodgers' Rebuttal Invalidity Report, challenging Dr. Meehan's opinions. *See* Dkt. 158-1 (Rodgers Rebuttal Report). Dr. Rodgers opined that the TDP-PO tools are tubing tools. *Id.*, ¶¶98-99. Dr. Rodgers states "this tool is not capable of being installed on a casing string because it is too small. It is designed for installation on smaller diameter completions tubing." *Id.* at ¶99; *see also id.* at ¶¶114-115, 118, 144. Dr. Rodgers set forth voluminous evidence showing that "casing string" has a well-known plain meaning to a POSITA. *Id.* at ¶¶100-113. Casing string is pipe with a minimum diameter of 4.5 inches used to case wells. *Id.* at ¶101. The TDP-PO, which is designed to be fitted to 3.5-inch pipe, is too small for casing string. *Id.*, ¶¶98-99, 114-115, 118, 144. As a result, the TDP-PO tool cannot as a matter of law anticipate the asserted claims. *Id.*; *see also id.* ¶208. Further, the TDP-PO tools do not obviate the asserted claims because, contrary to what Dr. Meehan says, they are not designed to connect to casing string. *Id.* at ¶¶144, 169, 172, 210.⁶

⁵ Dr. Meehan also offers obviousness opinions referencing the TDP-PO tool, all of which depend on his construction of the term "casing string" and stating that the TDP-PO tool is a casing tool. If the Court adopts NCS's construction of "casing string," Nine should be precluded from making any reference at trial to the TDP-PO tool, including offering any opinions by Dr. Meehan regarding the TDP-PO tool. Every opinion offered in Dr. Meehan's expert report regarding the TDP-PO tool is based on his construction of "casing string." Offering such opinions at trial would be in conflict with the Court's claim construction. Dr. Meehan does not offer any opinion that a tubing tool (such as the TDP-PO) could be re-designed to be used with casing.

⁶ *See supra* note 5.

II. Argument

A. There Is An *O2 Micro* Dispute About The Meaning Of “Casing String”

In *Markman*, the Supreme Court held that “the construction of a patent, *including terms of art* within its claim, is exclusively within the province of the court.” *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996) (emphasis added). If the parties have a dispute regarding the “plain meaning” of a claim term, that dispute must be resolved by the court before trial. *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1360-61 (Fed. Cir. 2008). As was the case in *O2 Micro*, the parties here dispute the plain meaning of a claim term - “casing string.” The Court must resolve this dispute by construing that claim term. *See id.*

In *O2 Micro*, the patent taught DC-AC converter circuits. The claims required a feedback control loop circuit control the conduction state of switches, “**only if** said feedback signal is above a predetermined threshold.” *Id.* at 1356. The parties proceeded to trial agreeing that the term “only if” had common meaning. At trial, however, each party had a different interpretation of the scope of the term “only if”. The plaintiff argued to the jury “only if” means the claim limitation only applies during steady state operation of a switching circuit, i.e. above a predetermined threshold. *Id.* at 1361. The defendant argued “only if” means the claim limitation applies to all operations, without exception, and thus the defendant could not infringe because its devices also control conduction below a threshold. *Id.* The jury found infringement and the defendant appealed, arguing the Court erred in not construing the term “only if” because the parties’ dispute meant that the jury had to construe “only if” in violation of *Markman*. *Id.* at 1360. The plaintiff argued there was no error because the parties agreed the term had common meaning. *Id.* Reversing the plaintiff’s verdict, the Federal Circuit found that the trial court erred by not construing the claim term “only if.” *Id.* at 1361. The Federal Circuit reasoned:

A determination that a claim term “needs no construction” or has the “plain and ordinary meaning” may be inadequate when a term has more than one “ordinary” meaning or when reliance on a term’s “ordinary” meaning does not resolve the parties’ dispute. In this case, for example, the parties agreed that “only if” has a common meaning, but then proceeded to dispute the scope of that claim term.... In this case, the “ordinary” meaning of a term does not resolve the parties’ dispute, and claim construction requires the court to determine what claim scope is appropriate in the context of the patents-in-suit.

Id.

As in *O2 Micro*, the parties in this case argue the plain meaning of the “casing string.”

The parties agree that casing string is pipe used to case a well, but disagree about whether casing string has a minimum diameter of 4.5 inches. This dispute requires the Court to construe the meaning of “casing string.” *See id.*

B. The Overwhelming Intrinsic and Extrinsic Evidence Supports Construing The Scope of “Casing String” to Mean Pipe That is ≥ 4.5 Inches In Outer Diameter And Used to Case Wellbores

The well-understood meaning of “casing string” in the oil and gas industry is that casing is pipe ≥ 4.5 inches in outer diameter used to case wellbores. The ’445 Patent, entitled “Casing Float Tool,” describes downhole float tools used to assist running a casing string into a wellbore. Dkt. 58-1 (’445 Patent) at Abstract, 1:16-17, 3:25-33. The patent does not describe tubing tools, which are tools connected as part of a *tubing string*, which is run *inside of casing* after the casing is cemented in place. *See* Dkt. 158-1 (Rodgers Rebuttal Report), ¶100. That distinction is important for many reasons, including that the ’445 Patent is directed at floating casing, not tubing.

A person of skill in the art understands that casing string has a well-understood standard size of no less than 4.5 inches. *Id.*, ¶¶100-101. This standard size is due to the standard size of wellbores, and the need to run tubing into the cased wellbore. *Id.*, ¶100. Tubing must be of smaller diameter to fit into the cased borehole. *Id.* Tubing is used to isolate zones for multistage

fracturing operations and reduced production flow rates (among other things). *See id.* Casing is not smaller than 4.5 inches because smaller diameter pipe would not permit enough internal diameter to run in the necessary completion tools. *Id.* As even Dr. Meehan admitted, the industry has standardized the size of pipe for casing that is ≥ 4.5 inches. Dkt. 121 (Meehan Depo. Tr.) at 24:22-25:11.

The voluminous extrinsic evidence corroborates Dr. Rodgers' opinion that when a person in the oil and gas industry uses the term "casing string" they are talking about pipe with a minimum diameter of 4.5 inches. Dkt. 158-1 (Rodgers Rebuttal Report), ¶¶100-113. This extrinsic evidence is discussed below.

Nine's Marketing Materials: Nine's smallest *casing plug* is 4.5 inches. Ex. A (Nine's BreakThru Prod. Spec. Sheet) at 2; Wood Decl., ¶3. When Nine advertises plugs smaller than 4.5 inches (which are used for completions), it refers to them as plugs for *tubing*. Ex. B (Nine's MagnumDisk Prod. Spec. Sheet); Wood Decl., ¶4.

API Standards: The American Petroleum Industry Specifications (API) is an industry reference used to establish standards for oilfield pipe. It includes the API casing table (Table C.1) that shows the minimum standard casing size is 4.5 inches in outer diameter ("O.D"). Dkt. 123, ¶9 (citing Dkt. 126-1 (API Specifications) at 102-104 (Table C.1)).

Halliburton Red Book: When asked where he would look to find available casing sizes, Dr. Meehan testified as a young engineer he would use the Halliburton Red Book, a small book that drillers and engineers carried in the field listing standard sizes for pipe. Dkt. 121 (Meehan Depo. Tr.) at 25:12-20. The Halliburton Red Book does not list casing smaller than 4.5 inches. Ex. C (Halliburton Red Book) at 2–8; Rodgers Decl., ¶4.

The World Oil Casing Catalog: This catalog identifies casing connections that are provided by numerous manufacturers around the world. *See generally* Dkt. 127 (World Oil Casing Catalog). None of the manufacturers offer casing smaller than 4.5 inches.⁷ *See id.*; *see also* Dkt. 158-1 (Rodgers Rebuttal Report), ¶101 (opining on World Oil Casing Catalog).

United States Wellbore Size: Dr. Rodgers canvassed oilfields across the United States, including the Permian Basin, Eagle Ford, and Barnett regions in Texas, the Marcellus region in Pennsylvania and West Virginia, and the Haynesville region in Arkansas. Across these oilfields and natural gas plays, there is not a single well casing smaller than 4.5 inches. Dkt. 158-1 (Rodgers’ Rebuttal Report) at ¶¶102-110.

In summary, the intrinsic and extrinsic record overwhelmingly supports the construction of “casing string” to mean pipe \geq 4.5 inches in outer diameter used to case a well.

C. No Evidence Supports The Interpretation of “Casing String” To Encompass Pipe Smaller Than 4.5 Inches In Diameter

Dr. Meehan agrees with Dr. Rodgers that standard casing size ranges from 20 inches to 4.5 inches in diameter. Dkt. 121 (Meehan Depo. Tr) at 24:22-25:11. But he claims that casing size is “occasionally less.” *Id.* at 25:5-11. His basis for saying this is that forty years ago, he used 2.875 inch diameter pipe to case vertical wells. *Id.* at 114:4-15; 197:25-198:11. Based on this experience, Dr. Meehan opines that “casing string” includes pipe diameters of less than 4.5 inches. This testimony is insufficient to overcome the overwhelming intrinsic

⁷ Nine argues that in the World Oil Casing Catalog, Centron lists casing at 4.280 inches O.D. Dkt. 158 (Nine Opp. to MPSJ of No Anticipation). This is 4.5-inch casing. Dkt. 176-1, ¶7. The listed 4.5-inch casing had a range of nominal O.D. range from 4.280 inches to 4.780 inches. *Id.*, ¶8 (citing Dkt. 177 (Centron 2006 Brochure) at 2; Dkt. 177-1 (Centron 2011 Brochure) at 2). The manufacturing process for Centron pipes, which are a fiberglass composite, results in a small range of variability in the pipe’s nominal outside diameter. *Id.*

and extrinsic evidence that at the time of the '445 Patent, the industry uniformly understood that casing must have a minimum diameter of 4.5 inches.

Similarly unavailing are Nine's arguments against NCS's proposed construction. Nine argues that tubing has sizes greater than 4.5 inches – an observation that establishes nothing regarding the minimum size of casing. Dkt. 158 (Nine Opp. to MPSJ of No Anticipation). Manufacturers list 4.5 inch pipe in both the tubing and casing catalogs because if a well is cased with larger diameter pipe (6 inch diameter pipe, for example) larger tubing can be run into the cased well. But there is no example of casing being *smaller than 4.5 inches*. There is no 3.5 inch pipe that is found in both the tubing and casing catalog.

Nine argues that casing and tubing are subject to the same API manufacturing and testing procedures. *Id.* at 7–8. But the manufacturing and testing procedures on the pipe have no bearing on how the oil and gas industry uses and understands the term “casing string”. Dkt. 176-1, ¶6.

Finally, Nine alleges there are only a few manufacturers listed in the World Oil Catalog that include casing at 4.5 inches in diameter. Dkt. 158 (Nine Opp. to MPSJ of No Anticipation) at 8. This argument does nothing to support Nine's construction. Again, the World Oil Casing Catalog includes casing as small as 4.5 inches diameter, but *none smaller*. *See generally* Dkt. 127.

D. Conclusion

When the evidence that Dr. Rodgers provides regarding the meaning of “casing string” is weighed against the evidence that Dr. Meehan has provided, there is no question that NCS has shown the plain meaning of casing string is pipe \geq 4.5 inches in outer diameter used to case a well. NCS respectfully requests the Court adopt this construction before trial.

Dated: January 11, 2022

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned certifies that all counsel of record were electronically served with a copy of the foregoing on January 11, 2022 via the Court's ECF system.

/s/ Domingo M. LLagostera

Domingo M. LLagostera